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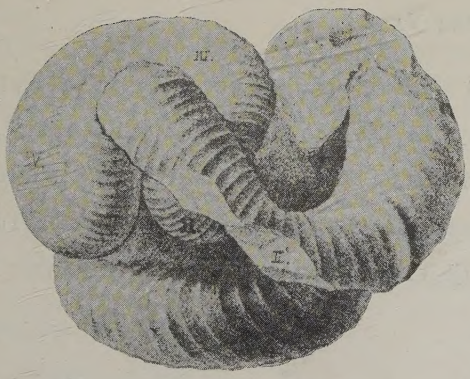

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201. THE OCCURRENCE OF THE GENUS *CYCLAMMINA* IN THE TERTIARY OF KYUSHU*

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Mining Department, Kyushu Institute of Technology.

九州第三系に於ける *Cyclammina* の産出：今日迄九州に於ては *Cyclammina* は報告されていなかつたが，今般筆者は初めて宮崎県の中新世たる野島層及び大草の始新世たる楠甫・志岐山両層から第1表の如き 6 種の *Cyclammina* を発見したので此処に報告する。この中天草のものは日本では，始新世からの最初の発見である。これら *Cyclammina* 諸種の産出と分布とは明らかに九州第三系の対比のための新しい示準化石となり得るものと考える。村田茂雄

As was already pointed out by K. ASANO (1950), *Cyclammina* is a genus characteristic of the Oligocene and the Miocene in the Circum-Pacific Region, and up to present it has not been yielded from the Pliocene. This paper is intended to report the occurrences of the fossils belonging to this genus at different stratigraphical horizons in the Tertiary of Kyushu.

In the summer of 1949, the writer discovered *Cyclammina* first in the Miocene Miyazaki Group in Miyazaki Prefecture; and then, in the autumn of the same year, he found it among the specimens in Dr. MATSUSHITA's collection from the Eocene Kusubo formation in Shimotsura-mura, Amakusa-gun, Kumamoto Prefecture. During 1950, fossil *Cyclammina* was discovered in succession from the Eocene Shikiyama formation in Itchoda-mura, Amakusa-gun, Kumamoto Prefecture (in the spring), and the Oligocene Nozima formation in Shisa-machi, Kitamatsuura-gun, Nagasaki Prefecture (in the autumn). Of these, those from the Kusubo formation represent the first Eocene occurrence in Japan.

The stratigraphical distribution of the genus *Cyclammina*, known in 6 species, in the Tertiary of Kyushu, as far as has been examined by the writer, is shown in the table 1.

Table 1. Distribution of *Cyclammina* in the Tertiary of Kyushu.

	Miocene	Oligocene	Eocene
Cyclammina cancellata BRADY	×		
C. japonica ASANO	×		
C. incisa (STACHE)	×	×	
C. pusilla BRADY		×	
C. pacifica BECK			×
C. tani ISHIZAKI			×

* Read Feb. 14, 1951; received April 18, 1951.

It is shown in the table that *Cyclammina incisa* (STACHE) ranges from the Oligocene to the Miocene, not only in Kyushu, but also in the Circum-Pacific Region as a whole. In the Miocene formation of the Miyazaki Prefecture, there are *Cyclammina cancellata* BRADY, *C. japonica* ASANO, the characteristic Miocene forms of Japan, and *C. incisa* (STACHE) found together. *Cyclammina pusilla* BRADY is found in the Oligocene Nozima formation together with *C. incisa* (STACHE). Of the Eocene species of Amakusa, *Cyclammina pacifica* BECK is common in the Eocene of the Circum-Pacific Region, while *C. tani* ISHIZAKI is a particular species abundant in the Eocene of Formosa.

The writer believes it an important conclusion that the stratigraphical order of the species of *Cyclammina* seen in Kyushu seems to hold true over all the Circum-Pacific Region. At any rate, it is evident from the facts referred to above, that the genus *Cyclammina* has an important stratigraphical value as an index fossil for the correlation of the Tertiary formations in Kyushu.

Finally, the writer wishes to express his cordinal thanks to Dr. K. ASANO, of the Tohoku University, Sendai, and Dr. T. OINOMIKADO, Chief Geologist of the Teikoku Oil Co., for their kind advices and comments, and to Prof. T. MATSUMOTO and Prof. H. MATSUSHITA of the Kyushu University for their kind encouragement and suggestions given to the writer in the present study: last but not the least is the writer owes to Prof. I. HAYASAKA of Kanazawa University for kindly discussing the problem and reading the manuscripts.

References

ASANO, K. (1950) Some Lituolidae from the Tertiary of Japan. *Contribution from the Cushman Foundation for Foraminiferal Research, vol. 1, parts 3 and 4*, pp. 75–79, 2 pls.

ISHIZAKI, K. (1941) A Note on *Cyclammina* from Taiwan (Formosa). *Taiwan Tigaku Kizi, vol. 12, nos, 2-3*, pp. 21-26.

MURATA, S. (1950) On the Discovery of the genus *Cyclammina* from the Paleogene Tertiary of Amakusa, Kyushu, (in Japanese). *Kagaku (Science), vol. 20, no. 3*, pp. 138-139.

—— (1951) On the Fossil Foraminiferal Fauna in the Miyazaki Group, (in Japanese). *Mineralogy and Geology* (in press).

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202. NOTES ON SOME TERTIARY PLANTS FROM TYOSEN (KOREA). II*

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朝鮮産第三紀植物化石・II：1943 年北大理学部紀要第 4 類第 7 巻第 1 号に発表した第 1 篇に続くもので，此の第 2 篇では *Fagus* 3 種，*Ulmus* 2 種及び *Zelkowa* 2 種を記載した。何れも朝鮮半島日本海岸地方中新世の地層から産出したもので，故北大教授大石三郎博士，元朝鮮総督府小平・魚谷両技官の採集されたものである。*Fagus* は多様多数且つ広く，*Zelkowa* も多数且つ広く産するが *Ulmus* はむしろ少い。藤岡一男

Contents

Genus *Fagus* L.

Of *Fagus* the following species of the genus have been reported from the Tertiary of Korea:

F. Antipofi HEER
Engelhardtia bed of Ryûhokudô, Kokangen coal-mine, N. Kankyô Dô (ENDO, 1938); coal-bearing formation of Agoti coal-mine, N. Kankyô Dô (ENDO, 1938); Ryûdô formation of N. Kankyô Dô (TATEIWA, 1925); Tyōhôri group of S. Kankyô Dô (TATEIWA, 1925); Tusen formation of Kôgen Do (ENDO, 1938); Changi flora of N. Keisyo Do (KRYSHTOFOVICH, 1921b).

F. americana SWEET or *F. ferruginea* AIT.
Enniti series of N. Keisyo Do (KANEHARA, 1936).
Kantindo formation of N. Kankyo Do (TATEIWA, 1925).

F. crenata BLUME.
Kantindo formation and *Engelhardtia* bed of N. Kankyo Do (ENDO, 1939, p. 341, Pl. 23, Fig. 9).

F. japonica MAXIM.
Kantindo formation of N. Kankyo Do (ENDO, 1939, p. 344. Xl. 23, Fig. 8).

F. multinervis NAKAI.
Engelhardtia bed and Kantindo formation of N. Kankyo Do and Tusen formation of Kogen Do (ENDO, 1939, p. 341, Pl. 23, Fig. 10).

Adding to them, the writer described here three new species of the genus from the Miocene localities of Northeastern Korea. They are *F. koraica* sp. nov., *F. protolongipetiolata* sp. nov., and *F. Uotanii* sp. nov.

It is surely interesting that considerably manifold forms of *Fagus* commonly

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*I. (*Journ. Fac. Sci., Hokkido Imp. Univ. Ser. 4, Vol. 7, No. 1*, 1943, pp. 117-141, 5 Pls.) Contents: Introduction, geology of fossil localities, and descriptions of the following species; *Salvinia pseudoformosa* OISHI et HUZIOKA, *Tilia distans* NATHORST, *T. japonica* SIMONKAI, *T. remotiserrata* ŌISHI et HUZIOKA, *T. meisenensis* HUZIOKA, *T. subnobilis* HUZIOKA, *Acer rotundatum* HUZIOKA, *A. subpictum* SAPORTA, *A. ezoanum* OISHI et HUZIOKA, *A. fatsiaefolia* HUZIOKA, *A. trilobatum* (STERNB.) var. *productum* AL. BRAUN, *A. ornatum* CARR., *A. japonicum* THUMB., *A.* sp., *A.* spp. (*samarae*), Cfr. *Platanus Guillelmae* GOPPERT.

distributed during the Miocene epoch almost all over the Korean peninsula where *Fagus* is quite barren now. At present *F. multinervis* NAKAI with which abundant fossils have been found identical or quite similar in the Northeastern Asiatic Miocene floras, grows on higher altitudes of islands of Uturyô and Saisyû, both being the marginal solitary islands off the Korean peninsula. According to NAKAI (1919) who studied the vegetation on these two islands, plants of the islands especially at the higher altitudes are rich in endemic elements which are considered as floral relics on a past continent before turning into islands as they are now.

Fagus koraica, sp. nov.

Plate 5, Figures 1-3.

Description:—Leaf ovato-elliptic, small in size, approximately 5 cm long and about twice of breadth, acuminate at the apex, broadly cuneate at the base. Margin crenate, serrate or crenato-serrate, except the basal entire part. Midvein rather slender, taking a zigzag course to the apex. Lateral veins 7–9 pairs in number, leaving the midvein at an angle of about 50°, nearly straight to the marginal teeth, though some of the lower pairs slightly decurrent below at their bases, the lowest pair derived quite nearly from the base of lamina. Finer veins weak, wavy crossed or networked, Petiole 4–7 mm long. Texture seems to be thin.

Comparison and remarks:—The present specimens are similar to the following living species in Eastern Asia: *Fagus Hayatae* PALIB. of North Formosa (Plate 5, Fig. 4), *F. lucida* REHDER et WILSON of Central China (Plate 5, Fig. 7), and *F. crenata* BLUME of Japan (Plate 5, Figs. 5 and 6), Compared with them, the fossil differs in having the acuminate apex and the slender nerves. Among the Tertiary *Fagus*, our specimens most closely resemble *F. Nathorsti* KONNO et OTUKA (1933, p. 410, Text-fig.) of the Asigakubo flora in Shizuoka pref., but this Pleistocene form is characterised by the constant and distinct marginal teeth Further allied fossils of Japan are *F. Hayatae* of MIKI from the Shimokurada lignite bed (MIKI, 1938, p. 224, Text-figs. 6 f–h) near Kamakura and the Katada plant bed of prov. Omi (MIKI, 1933, p. 219, Text-figs. 4 q–s), *F. ferruginea* var. MIKI (1933, p. 9, Plate 5, Figs. G, H; Text-figs. 6 f–h) from the Pleistocene lake-deposits of Yamashiro, and *Qnercus Stuxbergi* NATHORST (1888, p. 37, Plate 12, Fig. 7) from Yokohama. As already mentioned by KONNO and OTUKA (1933), these forms belong to the same foliar series of *Fagus* as well as this *F. koraica*. *F. koraica* is distinguishable from *F. ferruginea* AIT. *fossilis* NATHORST (1883, p. 43, Plate 4, Figs. 27–24; Plate 5. Figs. 1–11; Plate 6, Fig. 1) and *F. ferruginea altaica* SCHMALHAUSEN (1887, p. 206, Plate 21, Figs. 1–4) by the decidedly smaller size, decreased number of lateral veins and the mode of marginal serration.

Occurrence:—Ryûhokudô, Kokangen coal-mine, N. Kankyô Dô, *Engelhardtia* bed (Miocene). Colls. KODAIRA and UOTANI.

Fagus protolongipetiolata, sp. nov.

Plate 6, Figure 3.

Description:—Leaf long elliptic, 7 cm long 3.7 cm broad, acuminate at the apex, broadly cuneate at the base. Margin uniformly serrate. Midvein rather thin, straight to the apex. Lateral veins 11 pairs in number, opposite or subopposite, diverging at angles of about

50° from the midvein, slightly decurrent at their bases, straight to each marginal tooth. Petiole rather slender, 11 mm long. Texture seems to be thin.

Comparison and remarks:—The present specimen, as shown on Plate 6, closely resembles *F. ferruginea* Ait. *fossilis* Nathorst (1883, p. 43, Pl. 4, Figs. 17–24; Pl. 5. Figs. 1–11; Pl. 6, Fig. 1), but is distinguished from it by the long petiole and the broadly cuneate base. *F. ferruginea* Ait. *fossilis* Nathorst was named on fossil leaves from Mogi near Nagasaki and compared by Nathorst with an American living *F. ferruginea* Ait. (=*F. americana* Sweet). Florin (1930, p. 18, Pl. 5, Figs. 5–11; p. 29, Pl. 5, Figs. 7–9 (?); p. 36, Pl. 5, Fig. 12, (?) and some Japanese paleobotanists have reported its occurrences from several localities in Japan. Yabe and Endo (1930) once pointed out that the leaf-type called *F. ferruginea fossilis* is hardly distinguishable from such Chinese existing species as *F. ferruginea Rosthornii* figured by Ettingshausen in 1894. The writer who carefully compared the Korean fossil specimens with modern Chinese species of *Fagus* believes that this fossil, as well as most of *F. ferruginea fossilis* Nath. of the Japanese Neogene Tertiary has much closer relationship to *F. longipetiolata* Seemen (Pl. 6, Fig. 5) of China than to *F. ferruginea* Ait. (Pl. 6, Fig. 4) of North America, so far as leaves are concerned, as shown in Pl. 6 for comparison. *F. longipetiolata* now grows in provinces of Hunan, Hupeh, Szechwan, Yunnan, Kweichow and Chekiang of China.

Lately, Miki (1941, p. 270, Figs. 11 b, c) described some capules and leaves, under the name of *F. ferruginea*, from the *Pinus trifolia* bed of Aiti pref. of Honsyû. These remains also show close resemblance to those of *F. longipetiolata*. Madler (1939, p. 83, Pl. 7, Figs. 21–27, Text-figs. 27, 28) also reported *F. ferruginea fossilis* Nath. from the Pliocene beds of Klärbecken, Frankfurt a. M. in Germany. Mädler's specimens, as *F. attenuata* Göppert (1855, p. 18, Pl. 5, Fig. 6) which have been believed to be most related to *F. ferruginea* among the European fossil *Fagus*, may be more similar to the Asiatic *Fagus longipetiolata* Seem. than to the American *F. ferruginea* Ait.

Occurrence:—Ryûhokudô, Kokangen coal-mine, N. Kankyô Dô, *Engelhardtia* bed (Miocene), Colls. Kodaira and Uotani; Kantindô, Meisen-gun, N. Kankyô Dô, Kantindô formation (Miocene), Coll. Oishi.

Fagus Uotanii, sp. nov.

Plate 6, Figures 1, 2.

Description:—Leaf small, elliptic lanceolate, approximately 4–5 cm long and 1–2 cm broad, apex acuminate, base broadly cuneate or obtuse. Margin uniformly crenato-serrate. Midvein almost straight to the top of leaf, or occasionally takes a zigzag course at the apical part. Lateral veins regularly parallel, 11–13 pairs in number, diverging at angles of about 40° from the midvein, straight to each marginal tooth. Petiole 2–3 mm long. Texture seems to be thin.

Comparison and remarks:—*F. Uotanii*, sp. nov. is essentially related to *F. protolongipetiolata*, sp. nov. and *F. ferruginea* Ait. *fossilis* Nathorst (1883, p. 43, Pl. 4, Figs. 18–24; Pl. 5, Figs. 1–11; Pl. 6, Fig. 1), but is distinguished from them by the decidedly smaller and narrower leaf. This species distinctly differs from *F. koraica*, sp. nov. of the same locality by the shape of leaf and the

increasing number of lateral veins.

One of the leaves (Pl. 6, Figs. 5 and 5a) which KRYSHTOFOVICH (1921a, p. 20) figured as *F. Antipofi* from Possiet-bay of Southern Ussuri is clearly distinct from *F. Antipofi* HEER and may be a new species of *Fagus*. It apparently resembles our *F. Uotanii*, but it is lanceolate in shape (about 6.2 cm long and 1.6 cm wide) bearing wavy margin and 20 pairs of lateral veins.

Among the living species of *Fagus*, any very similar equivalent of *F. Uotanii* was not found so for, but *F. longipetiolata* SEEMEN and *F. Engleriana* SEEMEN and DIELS of China seem to be similar to it.

Occurrence:—Ryûhokudô, Kokangen coal-mine, N. Kankyo Dô, *Engelhardtia* bed (Miocene), Colls. KODAIRA and UOTANI.

Genus *Ulmus* L.

Ulmus is a common genus in forest trees of Korea. *Ulmus Davidiana* group (*U. Davidiana* PLANCH., *U. laciniata* MAYR., *U. macrocarpa* HANCE, *U. macrophylla* NAKAI and *U. manchurica* NAKAI) distributed mainely in northern Korea and *U. coreana* NAKAI in southern Korea.

Fossil *Ulmus* which has been reported from Korea, is only *U. Braunii* HEER (ENDO, 1938, p. 326) of the Tusen formation in Kôgen Dô. Recently HU and CHANEY (1940) described three species of *Ulmus* from the Miocene Shanwang flora of Shantung prov., China.

Descriptions of *U. carpinoides* GÖPPERT and *U. shiragica*, sp. nov. distinguished by the writer in the present disposal are as follows;

Ulmus carpinoides GÖPPERT

1855. *Ulmus carpinoides* GÖPPERT: p. 28, Pl. 13, Figs. 4–8 (not 9); Pl. 14, Fig. 1.
1855. *Ulmus minuta* GÖPPERT: p. 31, Pl. 14, Figs. 12–14.
1920. *Ulmus carpinoides*, REIMANN in KRAUSEL: p. 83, Pl. 5, Fig. 2; Pl. 6, Fig. 11; Pl. 8, Figs. 13, 14, 16–23; Pl. 9, Figs. 3, 4, 6, 11, 12; Pl. 10, Fig. 13; Text-figs. 7–10.

Some imperfect leaves referable to *Ulmus carpinoides* GÖPPERT (*U. minuta* type of GÖPPERT) were determined by the writer.

U. carpinoides GÖPPERT is one of the most common Tertiary plants in Northern Eurasia. The leaf-type of Korea is quite similar to that of the Miocene Obira series of Hokkaidô, both being *U. minuta* type of GÖPPERT. Out of Hokkaidô, *U. carpinoides* has been known from several Miocene localities in Japan.

Occurrence:—Kantindô, Meisen-gun, N. Kankyô Dô, Kantindô formation (Miocene), Colls. KODAIRA and UOTANI.

Ulmus shiragica, sp. nov.

Plate 5, Figure 8; Plate 6, Figure 6

Description:—Leaf ovate to ovate-elliptic, generally 8–11 cm long, apex acuminate, base slightly inequilateral, round or obtuse being somewhat cordate. Margin duplicato-serrate; small teeth 3–5 in one dent. Midvein stout and straight to the top of leaf; lateral veins 16–20 pairs in number, elegant, regularly parallel, straight of slightly up-curved to end in marginal dents, leaving the midvein at an angle of about 45°, though some lower pairs often wide-angled; tertiary veins branched from the lateral veins on the marginal border

and attained to the small teeth of margin; finer veins thin, delicate, clearly percurrent. Petiole thick, about 1 cm long. Texture seems to be thin.

Comparison and remarks:—*Ulmus shiragica*, sp. nov. is characterised by the regular lateral veins. In general habit of leaf, it is related to the living *U. Davidiana* group among which *U. macrocarpa* NAKAI of Korea and *U. Bergmanniana* SCHNEID. of China are most allied to it.

Among the known fossils, *U. dipterr* STEENSTR. (HEER, 1868, p. 1949, Pl. 27, Figs. 1-3) from Iceland somewhat resembles ours in nervation, but differs in the mode of marginal serration. Specimens from Azano of prov. Shinano which were called by NATHORST (1888, p. 23, Pl. 9, Figs. 4, 5) as *Carpiniphyllum pyramidale japonicum?* are very similar to *U. shiragica.*

Occurrence:—Kissyû-town, Kissyû-gun, N. Kankyô Dô, White Shale of the Kissyû formation (Miocene), Coll. OISHI; Kinkôdô, Usen-men, Geizitu-gun, N. Keisyô Dô, Enniti series (Miocene), Colls. KOKAIRA and UOTANI.

Genus *Zelkowa* SPACH

In Korea, *Zelkowa serrata* MAKINO and its var. *langifolia* NAKAI are now living generally south of N. 40° in latitudes, but fossils of *Zelkowa* occured commonly throughout the Miocene deposits of Eastern Korea.

In the present determination of the Korean fossil plants, the writer distinguished two species of *Zelkowa*, i. e. *Z. Tibae* OISHI et HUZIOKA and *Z. Ungeri* (ETTINGSHAUSEN) KOVATS, of which the latter has been known from the following localities of Korea:

Kantindô formation of N. Kankyô Dô (ENDO, 1938; TATEIWA, 1925).

Engelhardtia bed of N. Kankyô Dô (ENDO, 1938).

Ryudô formation of N. Kankyô Dô (TATEIWA, 1925).

Tusen coal-bearing bed of Kôgen Dô (ENDO, 1938).

Enniti series of N. Keisyô Dô (Kanehara, 1936).

Zelkowa Tibae OISHI et HUZIOKA (MS)

Plate 6, Figure 7

Description:—Leaf oval, 3.3 cm long and 1.5 cm wide; apex like a marginal dent, obtusely pointed; base broad, slightly cordate. Margin dentate; marginal dent large, seperated by a deep sinus, oval shape and obtusely pointed at the top. Lateral veins 7 pairs in number, forming wide angles to the midvein at the lower part of leaf and acute angles at the upper. Midvein rigid, straight to the apex. Petiole thick, 1.7 mm long.

Comparison and remarks:—This type of leaf is referable to *Z. Tibae* OISHI et HUZIOKA from the Miocene Obira series of the Uryû coal-field in Hokkaidô. *Z. Tibae* is distinguished from the known species of *Zelkowa* by characters of both ends of leaf and the large marginal dents.

Occurrence:—Ryûhokudô, Kokangen coal-mine, N. Kankyô Dô, *Engelhardtia* bed (Miocene), Colls. KODAIRA and UOTANI.

Zelkowa Ungeri (ETTINGSHAUSEN) KOVATS

Plate 5, Figure 9

1851. *Planera Ungeri* ETTINGSHAUSEN: p. 14, Pl. 2, Figs. 5-18.

1851. *Zelkowa Ungeri*, KOVATS: p. 27, Pl. 5, Figs. 1-12; Pl. 6, Figs. 1-6.
1852. *Zelkowa Ungeri*, UNGER: p. 114, Pl. 43, Fig. 19.
1888. *Planera Ungeri*, NATHORST: 'p. 7; Pl 1, Fig. 5; p. 9, Pl. 1, Figs. 7-11; p. 17; p. 19, Pl. 6, Fig. 9.
1931. *Zelkowa Ungeri*, KONNO in HOMMA: Pl. 9, Figs. 4, 5.
1933. *Zelkowa Ungeri*, MIKI: p. 45, Pl. 7, Text-figs. 2-6; Pl. 3, Fig. 1.
1936. *Planera Ungeri*, KANEHARA: p. 82.
1937. *Zelkowa Ungeri*, MIKI: p. 312, Pl. 9, Figs. n-o, Figs. 3 d-e.
1938. *Zelkowa Ungeri*, MIKI: p. 224, Text-figs. 6 f-h.
1938. *Zelkowa Ungeri*, ENDO: p 86; p. 87; p. 326.
1940. *Zelkowa Ungeri*, HU and CHANEY: p. 41, Pl. 15, Figs. 1. 3, 4; Pl. 16, Figs. 1, 3.

Many detached leaves and leaves-bearing branches were examined. *Zelkowa Ungeri* (ETTINGSHAUSEN) KOVATS is one of the most common fossils in the Miocene flora of Korea. It occured from the Miocene deposits of Shantung prov. of China (HU and CHANEY, 1940), Kengalake district (HEER, 1877, p. 53, Pl. 15, Fig. 19) and Ussuri (KRYSHTOFOVICH, 1921a, p. 22) of southeastern Siberia. *Z. Ungeri* is one of the most wide-spread plants in northern Eurasiatic continent, and ranged in Japan at least from Miocene to Pleistocene.

Z. Ungeri closely resembles the living *Z. serrata* MAKINO of Northeastern Asia, and is also similar to *Z. oregoniana* (KNOWLTON) BROWN (1937, p. 173, Pl. 51, Figs. 11-15) of the Miocene floras in Western United States.

Occurrence:—Kantindô, Meisen-gun, N. Kankyô Dô, Kantindô formation (Miocene), Coll. OISHI; Yûtendô, Meisen-gun, N. Kankyô Dô, Ryûdô formation (Miocene), Coll. OISHI; Kissyû-town, Kissyû-gun, N. Kankyô Dô, White Shale of the Kissyû formation (Miocene), Coll. OISHI; Kinkôdô, Usen-men, Geizitu-gun, N. Keisyô Dô, Enniti series (Miocene), Colls. KODAIRA and UOTANI.

References

BROWN, R. W. (1937) Addition to Some Fossil Floras of the Western United States. *U.S.G.S. Prof. Paper, 186-J.*

ENDO. S. (1938) Cenozoic Plants from Tyôsen (Korea). I and II. (in Japanese) *Jour. Geol. Soc. Japan., Vol.* 45.

ENDO, S. (1939) Some New and Interesting Miocene Plants from Tyosen (Korea). *Jub. Publ. Commem. Prof.* H. YABE's *60th Birthday.*

ETTINGSHAUSEN, C. (1851) Fossile Flora von Wien.

FLORIN, R. (1920) Zur Kenntniss der jungtertiären Pflanzenwelt Japans. *Kgl. Sv. Vet. Akad. Handl., Vol. LXI, No. 1.*

GÖPPERT, R. (1855) Die tertiäre Flora von Schossnitz in Schlesin.

HEER, O. (1868) Flora fossilis arctica. Vol. I.

HEER, O. (1877) Flara fossilis arctica. Vol. IV, Pt. 2, VI. Tertiäre Pflanzen aus dem Amurlande und der Mandschurei

HU, H. H. and CHANEY, R, W. (1940) A Miocene Flora from Shantung Pravince, China. *Carnegie Inst. Washington, Publ. No. 507.*

HUZIOKA, K. (1943) Notes on Some Tertiary Plants from Tyosen. I. *Jour. Fac. Sci., Hokkaido Imp. Univ., Ser. 4, Vol. 7, No. 1.*

KANEHARA, K. (1936) The Geology of the Northern Part of Geizitu District, North Keisyodo, Korea. (in Japanese) *Jour. Geol. Soc. Japan, Vol' 43, No. 509.*

KONNO, E. (1931) Cenozoic Plants of Central Shinano, in HOMMA: Geology of Central Shinano, Japan (in Japanese).

KONNO, E. and OTUKA, Y. (1933) Geology between Huzi-River and Yuhi-River, Sizuoka Prefecture. (in Japanese) *Jour. Geol. Soc. Japan, Vol. 40, No. 477.*

KOVATS, J. (1851) Die fossile Flora van Erdöbenye.

KRÄUSEL, R. (1920) Die Pflanzen des schlesischen Tertiärs. *Jahrb. preus. geol. L.-A., f. 1917, Vol. XXXVIII, Pt. 2.*

KRYSHTOFOVICH, A. (1921a) Some Tertiary Plants of Possiet-bay, Southern Ussuri District collected by Mr. E. AHNERT. *Rec. Geol. Com. Russ. Far East, No. 11.*

KRYSHTOFOVICH, A. (1921b) Contribution to the Tertiary Flora of Eastern Asia. To the Tertiary Flora of Changi in Korea. *Ibid., No. 18.*

MADLER, K. (1939) Die pliozäne Flora von Frankfurt am Main. *Abh. Senck. Naturf. Ges., Abh. 446.*

MIKI, S. (1933) On the Pleistocene Flora in Prov. Yamashiro. *Kyoto-hu Shiseki Meisyo Tennen Kinenbutu Tyosahokoku, No. 14.*

MIKI, S. (1937) Plant Fossils from the *Stegodon* Beds and the *Elephas* Beds near Akashi. *Japan. Journ. Botany, Vol. 8, No. 4.*

MIKI, S. (1938) On the change of flora of Japan since the Upper Pliocene and the floral composition at the Present. *Ibid., Vol. 9, No. 2.*

MIKI, S. (1941) On the change of flora in Eastern Asia since Tertiary Period (I). The Clay or lignite beds flora in Japan with special reference to the *Pinus trifolia* beds in Central Hondo. *Ibid., Vol. 11.*

NAKAI, T. (1919) Report on the Vegetation of the Island Ooryongto or Dagelet Island, Corea. (in Japanese).

NATHORST, A. G. (1883) Contribution à la flore fossile du Japan. *Kgl. Sv. Vet. Akad. Handl., Vol. XX.*

NATHORST, A. G. (1888) Zur fossilen Flora Japans. *Palaeont. Abh., Vol. IV, Ht. 3.*

SCHMALHAUSEN, J. (1887) Ueber tertiäre Pflanzen aus dem Thale des Flusses Euchtosma am Fusse des Altaigebirges. *Palaeontographica, Vol. XXXIII.*

TATEIWA, I. (1925) Geological Map of Tyosen. No. 4.

UNGER, F. (1852) Iconographia plantarum fossilium.

YABE, H, and ENDO, S. (1930) Mogi Fossil of the Province of Hizen and Its Geological Significance. *Proc. Imp. Acad., Vol. 6, No. 7.*

Localities of the described species

Ryuhokudō, Kokangen coal-mine, N. Kankyû Do, *Engelhardtia* bed (咸鏡北道, 古乾原炭礦, 龍北洞, *Engelhardtia* 層)
Fagus koraica, sp. nov., *F. protolongipetiolata*, sp. nov., *F. Uotanii* sp. nov. and *Zelkowa Tibae* OISHI et HUZIOKA.

Kantindo, Meisen-gun, N. Kankyo Do, Kantindo formation (咸鏡北道, 明川郡咸鎭洞, 咸鎭洞層)
Fagus protolongipeticlata, sp. nov., *Ulmus carpinoides* GÖPPERT, and *Zelkowa Ungeri* (ETT.) KOVATS.

Yûtendo, Meisen-gun, N. Kankyo Do, Ryûdo formation (咸鏡北道, 明川郡熊店洞, 龍洞層)
Zelkowa Ungeri (ETT.) KOVATS.

Kissyu-town, Kissyû-gun, N. Kankyo Do, White Shale of Kissyu formation (咸鏡北道, 吉州郡吉州邑, 吉州層白色頁岩)
Ulmus shiragica, sp. nov. and *Zelkowa Ungeri* (ETT) ROTVATS.

Kinkodo, Usen-men, Geizitu-gun, N. Keisyo Do, Enniti series (慶尙北道, 迎日郡烏川面金光洞, 延日統)
Ulmus shiragica, sp. nov. and *Zelkowa Ungeri* (ETT.) KOVATS.

Explanation of the Plates

(The figures are of natural size)

The specimens are stored in the Institute of Geology and Mineralogy, Faculty of Science, Hokkaido University, Sapporo.

Plate 5

Figs. 1-3 *Fagus koraica*, sp nov. Loc. Ryuhokudo, Kokangen coal-mine, N. Kankyo Do, *Engelhardtia* bed.

Fig. 4 *Fagus Hayatae* PALIB. Living leaf for comparison. Loc. Taihoku-syu, Taiwan (Formosa) (Coll. S. SASAKI).

Figs. 5-6 *Fagus crenata* BLUME. Living leaves for comparison. Loc. Woshima peninsula of Hokkaido.

Fig. 7 *Fagus lucida* LEHDER et WILSON. Living leaf for comparison. Loc. China (forwarded from S. TANG of the Peking Fan Mem. Inst.)

Fig. 8 *Ulmus shiragica*, sp. nov. Loc. Kinkodo, Usen-men, Geizitu-gun, N. Keisyo Do, Enniti series.

Fig. 9 *Zelkowa Ungeri* (ETT.) KOVATS. Loc. Kantindo, Meisen-gun, N. Kankyo Do, Kantiondo formation.

Plate 6

Figs. 1-2 *Fagus Uotanii*, sp. nov. Loc. Ryuhokudo, Kokangen coal-mine, N. Kankyo Do, *Engelhardtia* bed.

Fig. 3 *Fagus protolongipetiolata* sp. nov. Loc, Ibid.

Fig. 4 *Fagus ferruginea* AIT. Living leaf for comparison. Loc. U. S. A. (collected by S. ENDO).

Fig. 5 *Fagus longipetiolata* SEEMEN. Living leaf for comparison. Loc. China (forwarded from S. TANG of the Peking Fan Mem. Inst.)

Fig. 6 *Ulmus shiragica*, sp. nov. Loc. Kinōkōdo, Usen-men, Geizitu-gun, N. Keisyo Do, Enniti series.

Fig. 7 *Zelkowa Tibae* OISHI et HUZIOKA. Loc. Ryûhokudo, Kokangen coal-mine, N. Kankyo Do, *Engelhardtia* bed.

Photo. by KUMANO

Photo. by KUMANO

Trans. Proc. Palaeont. Soc. Japan N.S., No. 3, pp. 75—80, 2 text-figs. pl. 7, Sept. 1951.

Miscellaneous Notes on the Cambro-Ordovician Geology and Palaeontology No. XXIII.

203. ON THE LATE UPPER CAMBRIAN (FENGSHANIAN) FAUNA IN EASTERN JEHOL.*

By

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熱河東部の寒武紀後期（鳳山世）の動物群—虹螺梁及び楊家枚子所産の *Billingsella jeholensis* (nov.), *Pseudagnostus huangluoensis* (nov.); *Haniwa quadrata, Quadraticephalus pyrus, Asioptychaspis* cfr. *ceto, A. calyce, Pseudosaukia suni* (nov.) 及び種属不明の Saukid 尾板を記載する。そのうち *Pseudosaukia* は新属である。 小林貞一

In Eastern Jehol there is the late Upper Cambrian i. e. Fengshanian series, but the middle and early Upper Cambrian i. e. Daizanian and Changshanian series have not as yet been discovered. In the Fengshanian which is composed of sandstone, sandy shale, marl, slabbly limestone and limestone conglomerate, red color is most prevalent. It indicates probably a marginal facies of the Upper Cambrian formation of Eastern Asia.

In the Huangluohsien district, west of Chinchou, the middle Fengshanian red micaceous sandstone at a point (loc. 16) WSW of the Hamashan colliery yields the following fossils:

Billingsella jeholensis KOBAYASHI, new species.
Pseudagnostus huangluoensis KOBAYASHI, new species.
Haniwa quadrata KOBAYASHI.
Quadraticephalus pyrus KOBAYASHI.
Pseudosaukia suni KOBAYASHI, new genus and species.
Tsinania canens (WALCOTT).
Hamashania pulchra KOBAYASHI.

In the southwest of Haungluohsien ill-preserved *Calvinella* is found crowded along a ravine in two horizons in the upper Fengshanian red sandy shale (loc. 10), some 10 metres above the *Tsinania* horizon (loc, 11). For the Cambro-Ordovician stratigraphy of the district the reader is referred to my previous paper (1941). Further, *Asioptychaspis calyce* (WALCOTT), *A.* cfr. *ceto* (WALCOTT) and *Tsinania* sp. were contained in a red coarse sandstone and only *Pseudosaukia suni* KOBAYASHI in a dark red marl, both collected at a locality of Yangchiachengtzu, 5 km. SW of Huangluohsien.

This fauna is as yet undescribed except *Hamashania pulchra,* the pygidium of which is so aberrant that it made me to institute a new genus (1942). It is further a remarkable fact that a pygidium from the Middle Cambrian Taitzu formation at Hsiaohsih (Fengtien Province) in Manchuria on which ENDO (1944) established *Hsiaohsia quadrata,* new gen. and sp. reveals a remarkable resemblance with it. All other fossils are described here except *Tsinania canens* which will be discussed in a following paper.

*Read Dec. 2, 1950; received May 11, 1951.

Billingsella jeholensis KOBAYASHI, new species

Plate 7, Figures 1–4

Some 20 species of Pomatotremata described by KAYSER (1883), WALCOTT (1905, 12, 13), MANSUY (1916), SUN (1924), KOBAYASHI (1933, 35) and RESSER and ENDO (1937) from the Upper Cambrian of Eastern and Southeastern Asia, are referred to *Billingsella*, *Eoorthis*, *Huenella* or else as listed below. They are specifically distinct as can be judged from their outline and surface sculpture, but their preservation is mostly not durable to the strict taxonomy as recently improved by COOPER and others, except *Shiragia biloba* KOBAYASHI, 1935, and *Syntrophia orthia* WALCOTT on which *Palaeostrophia* was instituted by ULRICH and COOPER (1936).

Billingsella pumpellyi WALCOTT, 1905
Changshanian
B. loungcoensis MANSUY, 1916
Fengshanian
B. tonkinensis MANSUY, 1915
Changshanian
B. gottschei KOBAYASHI, 1933
Daishanian
B. hsishanensis KOBAYASHI, 1933
Fengshanian
B. willisi RESSER and ENDO, 1937
Fengshanian (Yenchou)
B. acjii RESSER and ENDO, 1937
Changshanian (Paishan)
B. simplex RESSER and ENDO, 1937
Changshanian (Paishan)
B. laohuensis ENDO, 1944
Fengshanian
Shiragia biloba KOBAYASHI, 1935
Changshanian
Eoorthis linnarssoni (KAYSER), 1883
Fengshanian
E. deois (WALCOTT), 1905
Fengshanian
E. kayseri (WALCOTT), 1905
Fengshanian
E. pagoda (WALCOTT), 1905
Fengshanian
E. shakuotunensis SUN, 1924
Fengshanian (*Eoorthis* zone)
E. pagodiformis KOBAYASHI, 1933
Fengshanian (*Dictyella* zone)
E. tatoensis RESSER and ENDO, 1937
Changshanian (Paishan)
E. edwardsi RESSER and ENDO, 1937
Changshanian (Paishan)
Palaostrophia orthia (WALCOTT), 1905
Fengshanian and (?) Daishanian
Huenella orientalis (WALCOTT), 1905
Fengshanian
H. sexplicata KOBAYASHI, 1905
Fengshanian

In *Billingsella jeholensis* KOBAYASHI, new species, the shell is subquadrate, its hinge margin being however, shorter than the maximum breadth, and biconvex, the convexity being stronger on the dorsal valve. As usual in *Billingsella* the vascular trunks are well developed, especially on the ventral valve; cardinal process seen on the dorsal valve to be a short simple ridge. Surface is ornamented by very fine innumerable ribs on which account it looks very similar to *Eoorthis shakuotunensis* SUN, 1924, but the outline is a little protruded laterally along the hinge line in SUN's. The holotype dorsal valve is 13.8 mm. long; its breadth 15.5 mm. at the mid-length and 13.3 mm. along the hinge margin.

Pseudagnostus jeholensis KOBAYASHI, new species

Plate 7, Figures 13–14

This species is represented by an external and internal mould of a pygidium, 3 mm. as long as broad, which is subquadrate and strongly convex; its marginal rim unusually broad, thickened on the rounded postero-lateral side;

anterior axial lobe unsegmented and non-tuberculated, broader than the pleural lobe, subquadrate, somewhat narrowing back and outlined by a distinct furrow; posterior lobe, on the contrary, only discernible by cross light, narrows back gradually and terminates at a short distance from the rim; pseudolobe recognizable by slight difference of convexity, swelling back very abruptly; surface smooth.

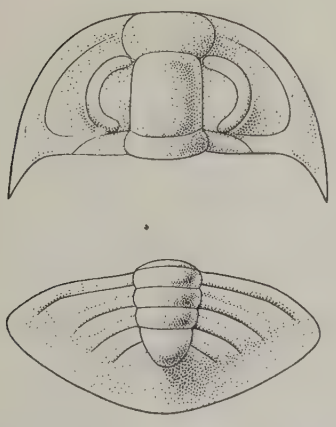
Among some 15 species of *Pseudagnostus* (KOBAYASHI, 1937), *P. gyps* (CLARK), 1923, and *P. cyclopygeformis* (SUN), 1924, may be the closest allies. The anterior axial lobe is, however, bi-segmented in the former, while the posterior axial lobe is practically obsolete in the latter. Further the median tubercle is present in them but absent in this species.

Haniwa quadrata KOBAYASHI, 1933

Plate 7, Figures 5–7, Text-figure 1

1933. *Haniwa quadrata* KOBAYASHI, *Japan. Jour. Geol. Geogr. vol. 9*, p. 149, pl. 15, figs. 7–8.

1937. *Haniwa quadrata* KOBAYASHI, *Jour. Fac. Sci. Imp. Univ. Tokyo. sect. 2, vol. 4, pt. 2.* p. 244, pl. 7, figs. 1–2, 5–6, 19–20.



Text-figure 1. *Haniwa quadrata* KOBAYASHI

This species has already been described in some detail, but now it is found that the free cheek has a short genal spine. The associated pygidium is twice longer than broad, about same size with the cephalon and surrounded by a narrow border; anterior margin gently arcuate; axial lobe narrow, prominent and composed of three rings and a terminal lobe whence a blunt post-axial ridge issues; pleural furrows strong, but interpleural furrows are weak; and marginal border flat and of moderate thickness.

Five species are known of this genus among which the subquadrate glabella and broad pygidium are the most significant characteristics of this species. The glabella is more elevated in *H. convexa* and the pygidium longer in *H. sosanensis*.

Quadraticephalus pyrus KOBAYASHI, 1933

1933. *Quadraticephalus pyrus* KOBAYASHI, *Japan. Jour. Geol. Geogr. vol. 11*, p. 123, pl. 12, fig. 8.

Quadraticephalus SUN, 1924, em. KOBAYASHI, 1933, can easily be distinguished from *Changia* SUN, 1924, by the size and position of the eyes, although the two are considered congenetic by RESSER, 1942. Beside *Q. walcotti* SUN, 1924, which is the type species, *Quadraticephalus* comprises *Ptychaspis calchas* WALCOTT, 1905, *Q. manchuricus* KOBAYASHI, 1933, *Q. teres* RESSER and ENDO in KOBAYASHI, 1933, *Q. quadratus* KOBAYASHI, 1935, *Q. elongatus* KOBAYASHI, 1935, *Ptychaspis* (?) *fengshanensis* SUN, 1935, and possibly *Q.* (?) *convexus* SUN, 1924. RESSER's reference of *Anomocare bianos* WALCOTT, 1905, to it (1942) is however doubtful.

In the outline of the glabella and other aspects a cranidium at hand is typical of *Quadraticephalus pyrus*; test seen roughened by granulation where it re-

mains. It is noted on the posterior limb of the fixed cheek that there is a prominent but short ridge along the dorsal furrow on each side of the pre-occipital lobe.

Asioptychaspis cfr. *ceto* (WALCOTT), 1950

This is represented by incomplete smooth cranidia. The smooth free cheek found associated is, however, flat like the one of *Ptychaspis* (?) sp. undt. in WALCOTT, 1913, on pl. 17 in fig. 1. The lateral rim is stout, distinctly elevated and protruded back into a spine, but the meso-occipital furrow as shown by WALCOTT cannot be seen.

Asioptychaspis calyce (WALCOTT)

1905. *Ptychaspis calyce* WALCOTT, *Proc. U. S. Nat. Mus. vol. 29*, p. 72.
1913 *Ptychaspis calyce* WALCOTT, *Research in China, vol. 3*, p, 184, pl. 16, figs. 15, 15a.
1933. *Asioptychaspic calyce* KOBAYASHI, *Japan. Jour. Geol. Geogr. vol. 11*, p. 118.

Two other cranidia of similar outline from the same locality with the preceding are identifiable with *Asioptychaspis calyce* (WALCOTT), 1905, because of their pustulose test.

Genus *Pseudosaukia* KOBAYASHI, new genus

Though this is similar to *Saukia* WALCOTT, 1914, em. ULRICH and RESSER, 1933, in the cephalon, the difference in the breadth of the fixed cheek evidently prohibits their confusion. The chief distinction between the two genera lies in the pygidium which is subcircular and provided with a flat border in *Saukia*, while it is semi-circular and its border distinctly inclined. Furthermore the test is generally granulated in *Saukia*, but smooth in *Pseudosaukia*.

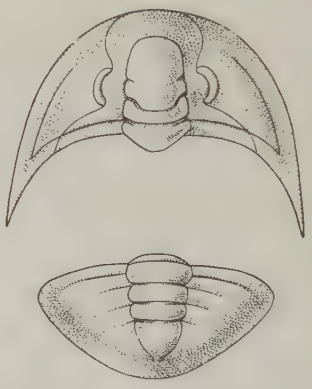
Type species:—*Pseudosaukia suni* KOBAYASHI, new species.

Distribution:—Fengshanian in Eastern Asia.

Pseudosaukia suni KOBAYASHI, new gen. and sp.

Plate, 7, Figures 8–11, Text-figure 2

Glabella subquadrate, much longer than wide, more or less rounded in front, outlined by a deep dorsal furrow; antero-



Text-figure 2. *Pseudosaukia suni* KOBAYASHI

lateral furrow indicated only by a pit; postero-lateral one deep, oblique and confluent with its fellow; occipital furrow deep and transversal; occipital ring thickened in the middle; eyes relatively large and opposed at the middle of the glabella; cranidium measured between the eyes twice broader than the glabella; frontal border moderately convex and fairly thick. Free cheek provided with a long spine.

Pygidium nearly semi-circular, but its frontal margin is slightly arcuate; axial lobe teretely conical, divided into three or four rings and a rear lobe which is abruptly narrowing; pleural lobe pro-

vided with three pleural furrows, nearly flat and inclined abruptly near the periphery. Surface smooth.

The detached carapaces can safely be combined in the species because no other fossil is found in the same slabs. A prominent spine issues from the axial ring on some detached thoracic segments.

In *Saukia aojii* KOBAYASHI, 1933, the fixed cheek is narrower, eyes smaller and its test granulated.

Suakid-pygidium, gen. and sp. undt.

Plate 7, Figure 12

Pygidium almost twice broader than long and semi-circular, but the articulating margin is gently arcuate and distinctly facetted on the lateral sides; axial lobe stout, prominently elevated above the flat and gently inclined pleural lobes, subcylindrical, but abruptly narrowing in the rear part, and composed of three rings and a terminal lobe; pleural lobe gently inclined toward the periphery; first rib prominent; others flat-topped but divided into two bands by a mesial weak furrow; pleural furrow shallow but relatively broad; marginal border of moderate breadth, delimited inside by a shallow groove and somewhat bent up behind the axial lobe. Surface smooth.

In the general aspect it reminds me of a suakid, but there is no trilobite in the collection which is thought to have this as its pygidium. It is a little taller and about three times larger than that of *Haniwa quadrata* and I have seen any of *Haniwa* which grows so large.

References

CLARK, T. H. (1923) A Group of New Species of *Agnostus* from Levis, Quebec. *Canada Field Naturalist, vol. 37, no. 7.*

ENDO, R (1944) Restudies on the Cambrian Formations and Fossils in Southern Manchoukuo. *Bull. Central Nat. Mus. Manchoukuo, 7.*

KAYSER, F. H. E. (1883) Cambrische Brachiopoden von Liau-tung in RICHTHOFEN's *China, Bd. 4.*

KOBAYASHI, T. (1933) Upper Cambrian of the Wuhutsui Basin, Liaotung, with special Reference to the Limit of the Chaumitian (or Upper Cambrian) Eastern Asia, and its Subdivision. *Japan. Jour. Geol. Geogr. vol. 11.*

—— (1935) The Cambro Ordovician Formations and Faunas of South Chosen, Palaeontology, Pt. 3, Cambrian Faunas of South Chosen with special Study on the Cambrian Trilobite Genera and Families. *Jour. Fac. Sci. Imp. Univ. Tokyo, sect. 2, vol. 4, pt. 2.*

—— (1937) On the Agnostids, Pt. 1. *Jour. Fac. Sci. Imp. Univ. Tokyo, sect. 2, vol. 5, pt. 5.*

—— (1941) The Cambro-Ordovician Formations in the Vicinities of Huangluohsien, west of Chinchou, in Eastern Jehol. *Bull. Geol. Inst. Manchoukuo, no. 111.*

—— (1942) Two New Trilobites Genera, *Hamashania* and *Kirkella. Jour. Geol. Soc. Japan, vol. 49.*

MANSUY, H. (1915) Faunes Cambriennes du Haut-Tonkia. *Mém. Serv. Géol. de l'Indochine, vol. 4, fasc. 1.*

—— (1916) Faunes Cambriennes de l'Extrême-Orient Méridional. *Mém. Serv. Géol. de l'Indochine, vol. 5, fasc. 1.*

RESSER, C. E. (1942) Fifth Contribution to Nomenclature of Cambrian Fossils. *Smiths. Misc. Coll. vol. 101, no. 15.*

—— and R. ENDO (1937) The Sinian and Cambrian Formations and Fossils of Southern Manchoukuo. *Manchurian Sci. Mus. Bull. 1.*

SUN, Y. C. (1924) Contributions to the Cambrian Faunas of North China. *Palaeontol. Sinica, ser. B, vol. 1, fasc. 4.*

—— (1935) The Upper Cambrian Trilobite-Faunas of North China. *Palaeontol. Sinica, ser. B, vol. 7, fasc. 2.*

ULRICH, E. O. and G. A. COOPER (1938)

Ozarkain and Canadian Brachiopoda. *Geol. Soc. Am. Sp. Pap. no. 13.*

—— and C. E. Resser (1913) The Cambrian of the Upper Mississippi Valley, pt. 2, Trilobita; Saukinae. *Bull. Publ. Mus. City Milwaukee, vol. 12, no. 2.*

WALCOTT, C. D. (1905) Cambrian Faunas of China. *Proc. U. S. Nat. Mus. vol. 30.*

—— (1912) Cambrian Brachiopoda, *U. S. Geol. Surv. Monogr. 51.*

—— (1913) Cambrian Faunas of China. *Research in China vol. 3.*

—— (1914) *Dikelocephalus* and other Genera of the Dikelocephalinae. *Smiths. Misc. Coll. vol. 57, no. 13.*

Explanation of Plate 7

Billingsella jeholensis KOBAYASHI, new species 76
Figure 1. Dorsal valve, internal cast
Figure 2. Dorsal valve, internal mould, holotype
Figure 3. Ventral valve, external mould
Figure 4. Ventral valve, internal mould
All twice magnified. Haungluohsien, Jehol, (loc. 16.)

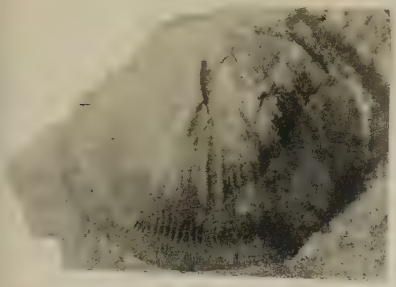
Haniwa quadrate KOBAYASHI, 1933 77
Figure 5. Cranidium
Figure 6. Free cheek
Figure 7. Pygidium
All five times magnified. Haungluohsien, Jehol, (loc. 16).

Psudosaukia suni KOBAYASHI, new gen. and sp. 78
Figure 8. Cranidium, holotype
Figure 9. Free cheek
Fiaure 10 Pygidium
Figure 11. Cranidium
All twice magnified. Yangchiachengtzu, Jehol

Suakid-pygidium, gen. and sp. undt. 79
Figure 12. Pygidium
One and half times magniged. Huangluohsien, Jehol, (loc. 16).

Pseudagnostus jeholensis KOBAYASHI, new species 80
Figure 13. Pygidium, cast from an inexternal mould
Figure 14. Pygidium, internal mould of the same individual, holotype
All six times magnified. Haungluohsien, Jehol, (loc. 16).

These specimens are all stored in the Geological Institute, University of Tokyo, Japan.



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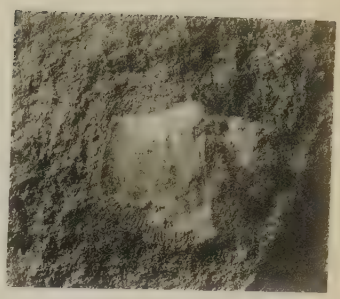

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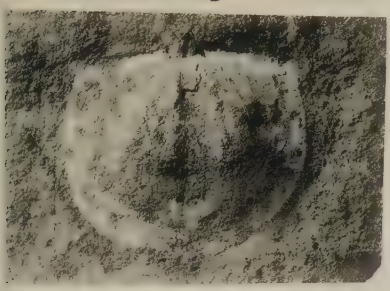

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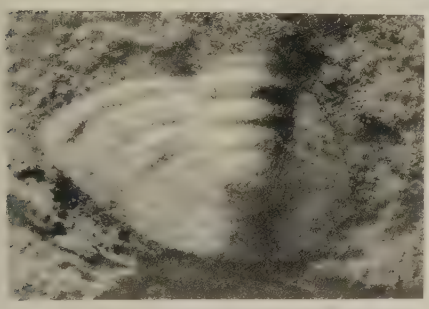

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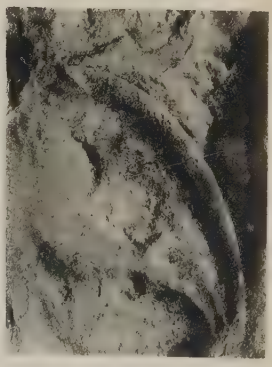

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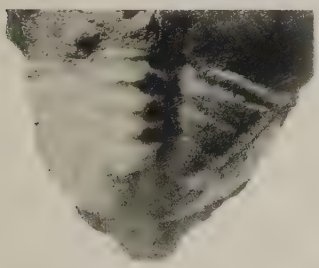

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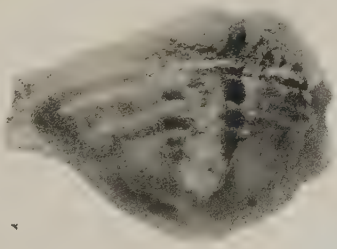

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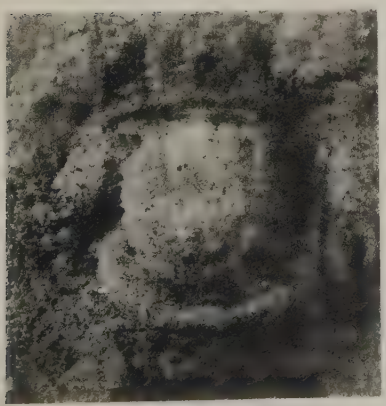

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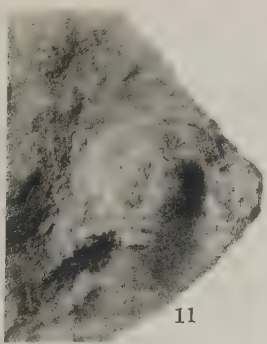

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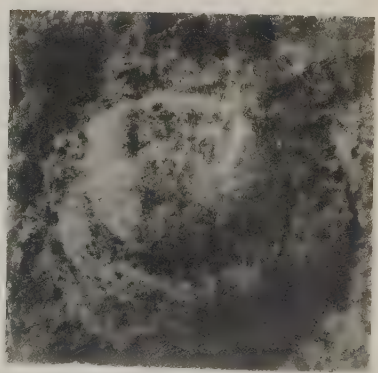

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Trans. Proc. Palaeont. Soc. Japan N.S., No. 3, pp. 81–84, pl. 8, Sept. 1951.

204. *NAGATOELLA FUJIMOTOI*, N. SP., AND A NEW STUDYING METHOD FOR FUSULINIDS.*

ROKURO MORIKAWA**

Saitama University of Earth Sciences

新種 *Nagatoella fujimotoi* と紡錘虫の新らしい研究方法について： *Nagatoella* 屬は 1936 年, *Thompson* が長門產の *Schellwienia ellipsoidalis* var. *orientalis* Ozawa を Genotype として命名した新屬であるが筆者は關東山地東部, 埼玉縣入間郡吾野村下久通において *Nagatoella* の一種を發見した。これは非常によく *chomata* が發達してゐるので, 今迄, 記載されたものと明らかに區別されので, こゝに *N. fujimotoi* として發表する。又 *Fusulina* は從來, 薄片にして觀察したが, 筆者は薄片にしないで, 只, 表面を磨くのみで反射顯微鏡によつて觀察する方法を考案したので玆にその概略を發表する。 森川 六郎

In the vicinity of Shômaru Tôge (Pass), Agano-mura, Iruma-gun, Saitama Pref., the Titibu System is extensively distributed. H. FUJIMOTO, of the Tôkyô University of Education has been rather actively engaged in geological surverying of this district during the past few years. The results of his work have already been published.[1] However, many changes in the delimitation of the Titibu System are necessary as a result of my restudy of the area. I have subdivided the strata in descending order as follows:

4. Kamikuzû Conglomerate ..... conglomeratic limestone.
3. Nitayama Group ..... graywacke, clayslate, chert, schalstein, and *Neoschwagerina* limestone.
2. Nenoyama Group ..... graywacke, clayslate, chert, schalstein, and *Schwagerina* limestone.
1. Takayama Group ..... Mainly, composed of black clayslate with graywacke and chert.

These Groups, crop out mostly along an anticline and two synclines. For convenience of description, these folds are named as follows: Kamikuzû syncline, Anazawa anticline, Nitayama syncline. The general trend of the axes of these folds is N50-60° W.

I collected several good specimens of Fusulinids which may belong to "*Nagatoella*" at Shimokuzû in the Kamikuzû conglomerate, the uppermost group in this district. Since "*Nagatoella*" is a very questionable genus I shall discuss it in the following paragraph.

Genus *Nagatoella* THOMPSON, 1936.

Genotype-Schellwienia ellipsoidalis var. *orientalis* OZAWA, 1925, *Jour., Coll. Sci., Tokyo Imp. Univ., Vol. 45, art. 6*, pp. 22, 23, pl. 8, fig. 3. (Not pl. 6, fig. la, pl. 8, fig. 5.)

Nagatoella THOMPSON, 1936, *Jour. Geol. Soc. Japan*, Vol. 43, pp. 196–198.

Scewagerina (Part) DUNBAR & SKINNER,

* Read. Dec. 2, 1950; received May 12, 1951.

** Contribution from the Laboratory of Earth Sciences, Saitama University.

1) H. FUJIMOTO: Stratigraphical and Palaeontological studies of the Titibu System of the Kwanto-mountainland Part. I, Stratigraphy. 1946, Science Reports of the Tôkyô Bunrika Daigaku Section C No. 4.

1937, *Texas Univ., Bull. 3701*, pp. 623-627.-DUNBAR, (in CUSHMAN) Foraminlfera, pp. 145-146.—DUNBAR & HENBEST, 1942, *Illinois Geol. Survery, Bull. 67*, p 82.

The genus was established by THOMPSON in 1936 on the basis of "*Schellwienia ellipsoidalis* var. *orientalis* OZAWA." His original description is as follows: "The shell of the *Nagatoella* THOMPSON is large and ellipsoidal, having broadly rounded poles. Mature shells of thirteen volutions are 6 to 7 mm. long and 3.5 to 4.5 mm. wide. The shell is ellipsoidal throughout growth of the individual, and the poles are broadly rounded throughout the shell. The spirotheca is composed of a tectum and a coarsely alveolar keriotheca. The spirotheca is thin in the first three to four volutions, but it is thick in the outer volutions. The septa are fluted throughout the length of the shell.

The fluting is widely spaced and is confined to the lower margins of the septa. The chomata are narrow and low in the inner four to five volutions and are discontinuous in the outer volutions. Dense calcite almost fills the chambers to the edges of the tunnel in the inner five to six volutions, and filling cover the inside of chambers from the tunnel to the poles in outer volution."

DUNBAR and his colleagues rejected the genus "*Nagatoella*", and placed OZAWA's original specimens of *Schellwienia* in *Schwagerina*.

In my later field work, I collected many good specimens of "*Nagatoella*" and will describe later. I concluded that the specimens can be distinguished from *Schwagerina* by their ellipsoidal shape, low septel fluting, distribution of axial fillings, the development of the spirotheca with growth of the shell, and the number of volutions.

These features are the characteristics by which THOMPSON established the genus "*Nagatoella*". Therefore, I accept THOMPSON's genus "*Nagatoella*".

Nagatoella seems to have developed from *Triticites* by the development of the chomata and to be an ancester of *Doliolina* and *Pseudodoliolina* according to its shape, number of volution, and parachomata.

Nagatoella fujimotoi, new species.

Plate 8, Figures 1-9

Description—Shell large, ellipsoidal, having broadly rounded poles. Mature shell of 11-12 volutions and have a form ratio of about 1 : 2. The width is about 2.7 mm. and the length 5 mm. The spirotheca is very thin in the inner volutions, but it becomes rather thick in the outer volutions. It is composed of a tectum and keriotheca, and deposits of dense calcite cover its surface in all volutions, so in the oblique section, the septa cannot be seen in the inner volutions. The septa are thick, and are fluted throughout the shell length. The semi-circular chomata are distinct in all volutions, and the tunnel angle is 25°. The proloculus is spherical, very small and its inside diameter measures about 100 microns.

Result of measurement are as follows

	Rate of growth			Thickness of spirotheca			No. of septa	
Proloculus	0.10		0.11	—	—	—	—	—
1	0.15	—	0.22	0.08	—	0.01	9	—
2	0.28	—	0.25	0.08	—	0.01	13	—
3	0.36	—	0.40	0.08	—	0.01	16	—
4	0.48	0.23	0.51	0.08	—	0.01	18	—
5	0.58	0.34	0.65	0.08	—	0.02	21	—
6	0.82	0.50	0.80	0.08	—	0.02	23	18
7	1.15	0.76	1.07	0.08	0.07	0.03	21	21
8	1.38	1.18	1.32	0.09	0.07	0.03	26	24
9	1.88	1.75	1 92	0.14	0.11	0.04	33	25
10	2.13	2 19	2.17	0.14	0.11	0.08	33	25
11	2.60	2.69	2.72	0.12	0.12	0.10	31	30
Specimen	6	7	1	6	7	1	1	3

Comparisons:—The general appearance of this species is like *Nagatoella orientis* THOMPSON, but its better development of the chomata in all volutions and the small proloculus serve readily to distinguish the present specimen. This species also allied to *Pseudodoliolina ozawai* YABE & HANZAWA, but differs in having remarkable parachomata.

Remarks:—The specific name is given in honor of Professor Haruyoshi FUJIMOTO, the Tôkyô University of Education, from whom I have received valuable help and many suggestions in my palaeontological work in Fusulinids as well as for my field study in Titibu district.

Occurrence:—Middle Permian. In the conglomeratic limestone at Shimokuzû, Agano-mura, Iruma-gun, Saitama Prefecture. The present specimens are found in association with *Parafusulina japonica*, *Schwagerina* sp., *Mizzia velebitana*, *Pseudoschwagerina* sp., and *Pleurotomaria* sp.

Cotype No. 10506 ..... Laboratory of Earth Sciences, Saitama University.

New method of Study for Fusulinids.

The inserted photographs have been taken of the new etching method. Previously thin sections had to be made to study fusulinids. Since it is very difficult to make thin sections, I worked out another way of studying Fusulinids. The basis of the method is to etch the specimens by acetic acid. The first step is to polish the material with a grinding machine and flatten the surfaces. Then, immerse it in 20% acetic acid for about 2-3 miniutes Again, polish with chromium oxide or red ochre on woollen cloth, so that a luster is given and the fusuli-

nids are in relief on the surface. Then, the Fusulinids are easily seen under a reflecting microscope.

This method is very simple and saves time and expense. Moreover, the new method permits making of cross sections and axial sections from the same individual. Previously, there was no method of making both cross and axial sections from the indevidual.

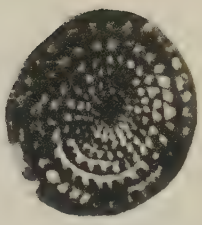
I wish to express my hearty thanks to Prof. Riuji ENDO, for his many helpful suggestions and criticisms. I also express my graditude for the financial help provided by the Educational Department.

Explanation of Plate 8.

Nagatoella fujimotoi, n. sp.

Fig. 1.	cross section	×10
2.	〃 〃	×25
3.	〃 〃 (slightly oblique)	×10
4.	〃 〃 (〃 〃)	×10
5.	〃 〃 (〃 〃)	×10
6.	axial section	×10
7.	〃 〃 (slightly oblique)	×10
8.	〃 〃 (〃 〃)	×10

1



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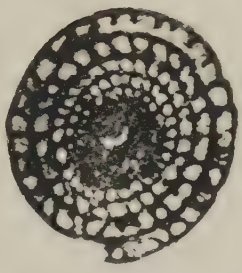

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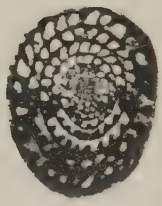

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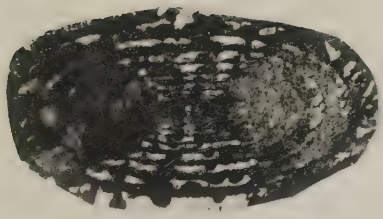

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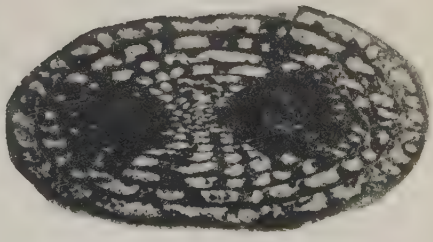

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Trans. Proc. Palaeont. Soc. Japan N.S., No. 3 pp. 85—93, 2 text-figs Sept. 1951.

205. ON SOME *EHRENBERGINA* FROM JAPAN[1)]

by

YOKICHI TAKAYANAGI

Institute of Geology and Paleontology, Tohoku University, Sendai, Japan.

日本産 *Ehrenbergina* の二三について：日本の第三紀の *Ehrenbergina* はその産出が極めて少なく，三浦半島と能登半島から報告されているに過ぎなかつたが，今回筆者は房総半島の鮮新世有孔虫の研究中に本属を見出し，更に仙台附近の中新統からも同様これが産出することが判明したので，日本産の種についてこれらの近縁種との形態的比較考察を試みつゝ記載した。 高柳洋吉

Introduction

The genus *Ehrenbergina* which was first described by Reuss in 1850 based upon *E. serrata* Reuss from the Miocene of Austria, is now known to contain more than 30 species and subspecies. These species have been reported from remote localities ranging from the Eocene of North America, the Oligocene and Miocene of the West Indies and the Pliocene of Japan. As Recent the genus has been reported from the Indo-Pacific and tropical western Atlantic, but is most abundant in the Pacific; its bathymetric range is from the littoral zone down to 2000 fathoms.

The occurrence of this widely distributed genus in the Tertiary of Japan was first made known by Asano (1938), who described *Ehrenbergina serrata* Reuss from the Pliocene Nojima formation at Nojima, Kanazawa-machi, Totsuka-Ku, Yokohama in Kanagawa Prefecture. Recently he (Asano, 1951) reported a new species of the genus from the Miocene Awakura formation at the northern end of the Noto Peninsula in Ishikawa Prefecture.

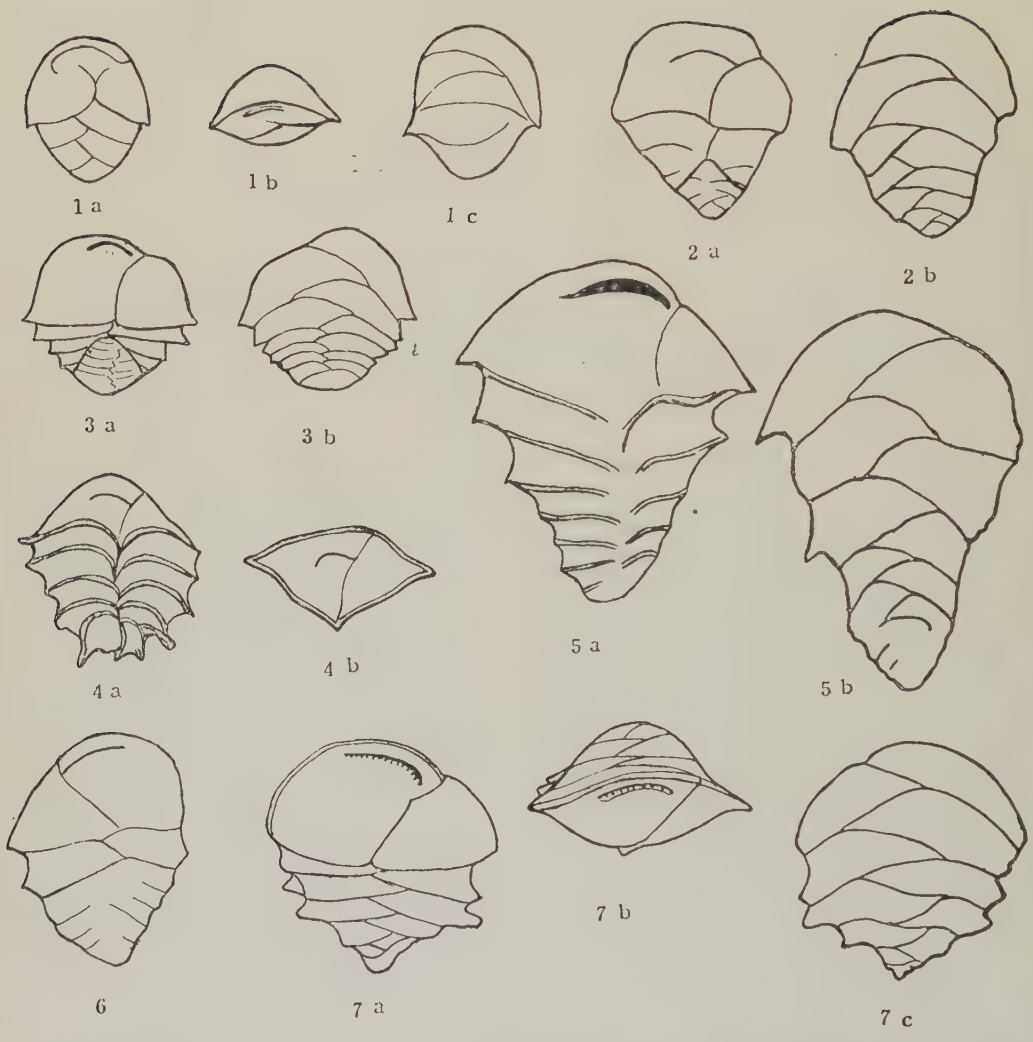
Fortunately, the writer discovered additional species of the genus in the material collected by Messrs. Kenzo Hatori and Toshio Abe from the Pliocene formations of the Boso Peninsula, Chiba Prefecture. These are described in this paper and the Japanese Tertiary forms are brought into comparison with previously known related forms.

In the present paper, 14 of the known 30 species and subspecies of *Ehrenbergina* are brought into comparison with the Japanese forms of the genus. The remaining 16 species were omitted from comparison, owing to their not being intimately related forms.

The species brought into comparison with the Japanese forms are:

Ehrenbergina amina Bermudez
E. bradyi Cushman
E. caribbea Galloway and Heminway
E. compressa Cushman
E. falcata Bermudez
E. mestayeri Cushman
E. navalis Hadley
E. pacifica Cushman
E. pineyroi Bermudez
E. serrata Reuss
E. serrata gibbera Galloway and Heminway
E. spinossisima Cushman and Jarvis
E. trigona Göes
E. trigona braziliensis Cushman

1) Read May 3, 1951; received June 13, 1951



Explanation of Figures 1–7.

Fig. 1. *Ehrenbergina amina* FERMUDEZ. × 80; a, ventral view; b, apertural view; c, dorsal view. After BERMUDEZ.

Fig. 2. *Ehrenbergina notoensis* ASANO. × 62; a, ventral view; b, dorsal view. After ASANO.

Fig. 3. *Ehrenbergina serrata* REUSS. size not given; a, ventral view; b, dorsal view. After REUSE.

Fig. 4. *Ehrenbergina spinossisima* CUSHMAN and JARVIS. × 50; a, ventral view; b, apertural view. After CUSHMAN and JARVIS.

Fig. 5. *Ehrenbergina trigona braziliensis* CUSHMAN. × 80; a, ventral view; b, dorsal view. After CUSHMAN.

Fig. 6. *Ehrenbergina compressa* CUSHMAN. × 60; ventral view. After CUSHMAN.

Fig. 7. *Ehrenbergina serrata gibbera* GALLOWAY and HEMINWAY. × 53; a, ventral view; c, dorsal view. After GALLOWAY and HEMINWAY.

Acknowledgements

The writer thanks Dr. Kiyoshi ASANO for supervising the present study, Prof. Shoshiro HANZAWA for the permission to submit the manuscript for publication, and Dr. Kotora HATAI for his advice concerning the present work. Thanks are also due to Messrs. Kenzo HATORI and Toshio ABE for kindly submitting their materials to the writer's study.

Systematic Description

Family *Cassidulinidae*

Subfamily *Cassidulininae*

Genus *Ehrenbergina* REUSS, 1950

By the form of the median part of the ventral side the species treated herein can be distinguished into two types, namely, those of lens-shape or type 1 and those of subtrigonal shape or type 2. Among the Japanese species, *E. notoensis* belongs to type 1 and *E. bosoensis* and *E. bosoensis decorata* to type 2.

Ehrenbergina notoensis ASANO, 1951

Text-figures 2a-b.

1951. *Ehrenbergina notoensis* ASANO: Illust. Cat. Japan. Tert. Small. Foram., pt. 7: Cassidulinidae, p. 6, figs. 29, 30.

Description:—Test subtriangular in dorsal view, lens-shaped in apertural view, oval in side view, the early part as thick as the later part, which is uncoiled; dorsal side convex, ventral side somewhat depressed; edge rounded, almost entire on earlier portion; with a few spines on later portion, chambers low and broad, not inflated, about 6 pairs visible on dorsal side; dorsal sutures curved, overlapping about half their length, flush with the surface, ventral suture indistinct, nearly flush with the surface; wall smooth; aperture elongate, narrow, slightly curved, near the middle of the test, nearly parallel to the margin. Length up to 0.5 mm; width up to 0.4 mm.

Holotype:—Ishii, Yanagida-mura, Noto Peninsula, Ishikawa prefecture. Lat. 37° 22′ 24″ N., Long. 137° 6′ 40″ E. Awakura formation, Miocene. IGPS coll. cat. no. 66145.

Occurrence:—Common in the Miocene formations of Noto Peninsula, Ishikawa Prefecture.

Remarks:—The following species belong to the same type with *E. notoensis*, namely, *E. amina*, *E. compressa*, *E. serrata*, *E. serrata gibbera*, *E. spinossisima* and *E. trigona braziliensis*. *E. amina* is from the middle Miocene of Dominica, *E. serrata* from the Miocene of Austria, *E. serrata gibbera* from the upper Oligocene and lower Miocene of Porto Rico and, *E. spinossisima* from the Miocene of Jamaica, middle Miocene of Haiti and Dominica. *E. compressa* and *E. trigona braziliensis* are Recent species from the tropical zone off the coasts of the Pacific and Atlantic sides of South America.

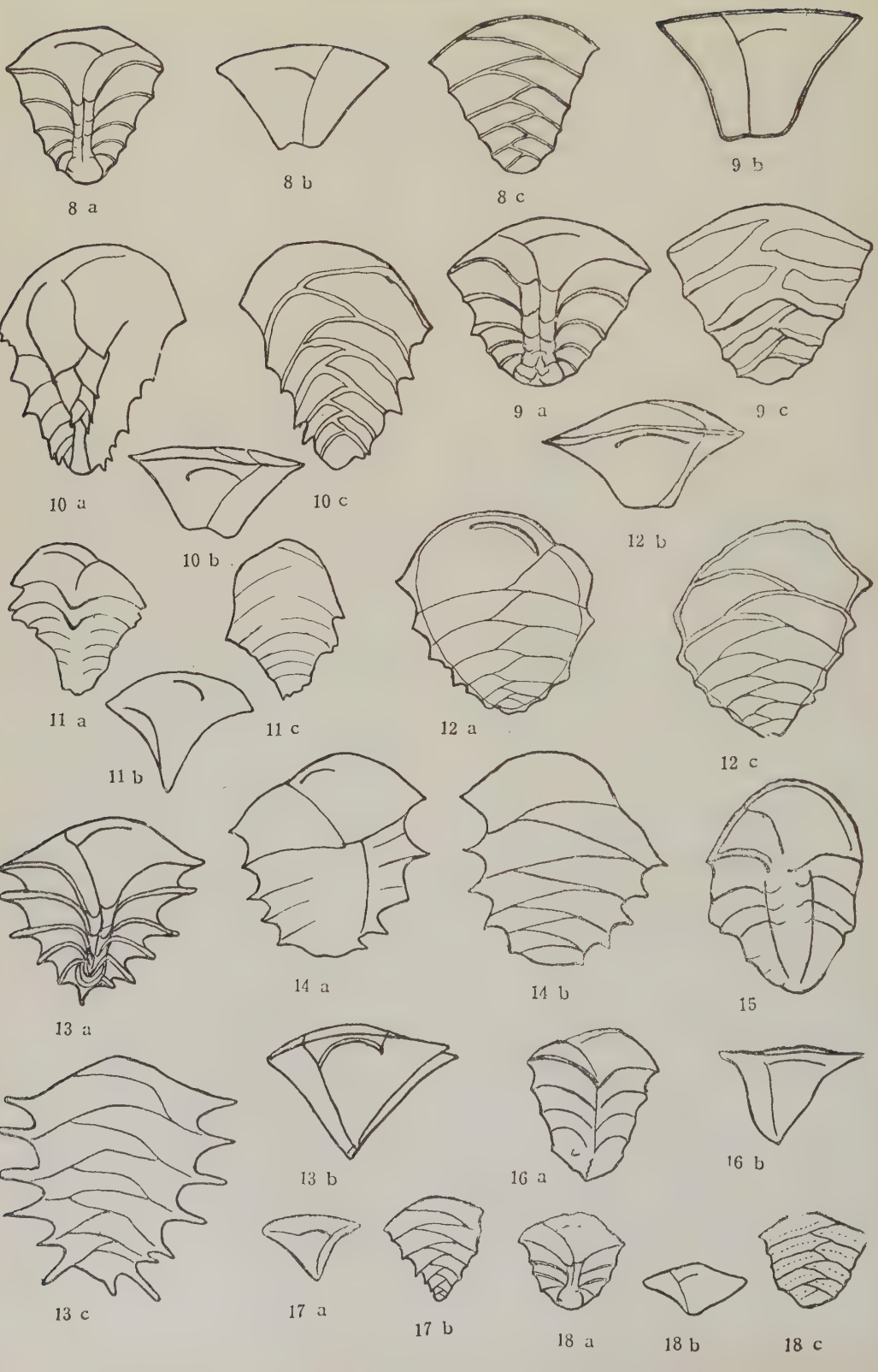
In classifying this first type, the form of coiling of the early chambers, sutures and development of the spines are important. For further classification, for example, in the case of *E. compressa* and *E. serrata*, the *E. serrata*, the proportion of length to width and tapering angle are used. The characters and figures of each species are shown in Table 1 and Figs. 1–7.

Ehrenbergina bosoensis TAKAYANAGI, n. sp.

Text-figures 8a-c.

1938. *Ehrenbergina serrata* ASANO (not REUSS): *Contr. Inst. Geol. Pal. Tohoku Univ. (in Japanese), No. 31*, p. 40.

Description:—Test triangular, short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14 b
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16 a
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13 c
17 a
17 b
18 a
18 b
18 c

and broad in dorsal view, subtriangular in apertural and side view; dorsal side convex, ventral side with a broad median furrow, bounded by concave slopes; edge sharp, with short, small, downward-pointing spines on each end of sutures and spical end; chambers low and broad, not inflated, later ones uncoiled, 6 to 7 pairs; dorsal sutures curved, overlapping less than half their length, limbate, raised, ventral sutures raised, curved, obscure on the median furrow; both sutures extend to the periphery and form spines; aperture elongate, narrow, slightly curved, nearly parallel to the margin. Length up to 0.40 mm; width 0.56 mm.

Holotype:—IGPS loc. no. Ch-6; South cliff of the Minato River, about 350 m N of Seki, Sekitoyo-mura, Kimitsu-gun, Chiba Prefecture. Lat. 35° 12′ 15″ N., Long. 139° 56′ 47″ E. Kiwada formation, Pliocene. IGPS coll. cat. no. 67130.

Occurrence:—Common in the Kiwada and Kokumoto formations of the Boso Peninsula, Chiba Prefecture.

Ehrenbergina bosoensis decorata TAKAYANAGI, n. subsp.

Text-figures 9a-c.

Description:—Test triangular, short and broad in dorsal view, subtriangular in apertural and side view, dorsal line almost straight in apertural view; dorsal side convex, ventral side with a broad median furrow, bounded by concave slopes; edge sharp, with short, small, downward-pointing spines on each end of sutures and apical end; chambers low and broad, not inflated, later ones uncoiled, 6 to 7 pairs; dorsal suture curvd, overlapping less than half their length, forming raised keels extending to the peripheral spines especially on the earlier chambers; ventral suture raised, curved, forming raised keels on the earlier median furrow; aperture elongate, narrow, slightly curved, nearly parallel to the margin. Length up to 0.40 mm; width 0.50 mm.

Holotype:—IGPS loc. no. Ch-7; Road

Explanation of Figures 8-18.

Fig. 8. *Ehrenbergina bosoensis* TAKAYANAGI, n. sp. ×64; a, ventral view; b, apertural view; c, dorsal view.

Fig. 9. *Ehrenbergina bosoensis decorata* TAKAYANAGI, n. subsp. ×64; a, ventral view; b, apertural view; c, dorsal view.

Fig. 10. *Ehrenbergina bradyi* CUSHMAN. ×60; a, ventral view; b, apertural view; c, dorsal view. After BRADY.

Fig. 11. *Ehrenbergina falcata* BERMUDEZ. ×28; a, ventral view; b, apertural view; c, dorsal view. After BERMUDEZ.

Fig. 12. *Ehrenbergina caribbea* GALLOWAY and HEMINWAY. ×53; a, ventral view; b, apertural view; c, dorsal view. After CALLOWAY and HEMINWAY.

Fig. 13. *Ehrenbergina pacifica* CUSHMAN. ×60; a, ventral view; b, apertural view; c, dorsal view. After BRADY.

Fig. 14. *Ehrenbergina navalis* HADLEY. ×50; a, dorsal view; b, ventral view. After HADLEY.

Fig. 15. *Ehrenbergina mestayeri* CUSHMAN. ×60; ventral view; After CUSHMAN.

Fig. 16. *Ehrenbergina pineyroi* BERMUDEZ. ×40; a, ventral view; b, apertural view. After BERMUDEZ.

Fig. 17. *Ehrenbergina trigona* GOES. size not given; a, apertural view; b, dorsal view. After GOES.

Fig. 18. *Ehrenbergina* sp ×64; a, ventral view; b, dorsal apertural view; c, dorsal view.

TABLE 1

Species of *Ehrenbergina*	Apertural view		Dorsal sutures	Median part of ventra side
	Outline	Dorsal line		
amina	lens-shaped	curved	depressed	not raised
compressa	〃	〃 ?	depressed	〃
notoensis	〃	〃	flush with the surface	〃
serrata	〃	〃	flush with the surface	〃
serrata gibbera	〃	〃	flush with the surface	〃
spinossismima	〃	〃	later portion depressed	〃
trigona braziliensis	〃	〃	flush with the surface	〃
bosoensis	subtrigonal	〃	raised	broad median furrow
bosoensis decorata	〃	almost straight	raised	broad median furrow
bradyi	〃	almost straight	flush with the surface	broad median furrow
caribbea	〃	almost straight	middle part of the later ones raised	broad flat ridge bounded by concave slopes
falcata	〃	curved	flush with the surface	last 2 chambers form curved claws
mestayeri	〃	curved	not at all depressed	raised smooth area
navalis	〃	curved	flush with the surface	round median furrow
pacifica	〃	curved	flush with the surface	narrow median furrow
pineyroi	〃	almost straight	flush with the surface	round median ridge
trigona	〃	curved	flush with the surface	with or without central furrow

Ventral sutures	Chambers		Spines		Range
	Number of pairs	Overlapping	Position	Direction	
not raised	4–5	more than half	only each side of the last inflated chambers	downward	mM
depressed	6–7	less than half	each edge	outward	R
flush with the surface	6–7	by half width	later part	downward	mM
depressed	>8	less than half	each edge	downward	M
depressed	6–7	by half width	each edge, apical and ventral end	outward	uO–lM
depressed	6–7	less than half	keels and spines	outward	M
depressed	>8	by half width	each edge	downward	R
raised	6–7	less than half	each end of suture and apical end	downward	P
raised	6–7	less than half	keels and spines	downward	P
depressed	>8	less than half	each edge and median furrow	downward	M–R
flush with the surface	6–7	by half width	each edge, apical and ventral end	outward	mO–lM
flush with the surface	>8	less than half?	each edge and median furrow	downward	uO
depressed	>8	less than half?	each edge	downward	R
flush with the surface	4–5	more than half	each edge and median furrow	outward	O
depressed	>8	more than half	upper angle of each chamber	outward	R
raised?	>8	less than half?	each edge and median furrow	outward	uO
depressed	6–7	more than half	lower angle of each chamber	downward	R

u: upper m: middle l: lower O: Oligocene M: Miocene
P: Pliocene R: Recent

side cutting, about 1100 m NNW of Higashi-owada, Tamaki-mura, Kimitsu-gun, Chiba Prefecture, Lat. 35° 13′ 34″ N., Long. 139° 55′ 54″ E. Kokumoto formation, Pliocene. IGPS coll. cat. no. 67131.

Occurrence:—Rare in the Kiwada formation, but common in the Kokumoto formation.

Remarks:—The following species belong to the same type with *E. bosoensis* and *E. bosoensis docorata*, namely, *E. bradyi, E. carribea, E. falcata, E. mestayeri, E. navalis, E. pacifica, E. pineyroi, E. trigona. E. bradyi* has a wide distribution in the Pacific and Atlantic Oceans, and occurs from the Miocene of Haiti, Pliocene of California and Pleistocene of the North Atlantic deep sea. *E. carribea* is known from the upper Oligocene to lower Miocene of Porto Rico, *E. falcata* from the upper Oligocene of Dominica, *E. navalis* from the Oligocene of Cuba and *E. pineyroi* from the upper Oligocene of Dominica. *E. carribea* and *E. navalis* have been recorded from the middle Oligocene of Dominica by BERMUDEZ (1949, p. 271), but his figures do not agree with the holotype figured by GALLOWAY and HEMINWAY or, HADLEY; they may represent allied but undescribed species. *E. mestayeri, E. pacifica* and *E. trigona* are Recent species. Although the precise distribution of *E. mestoyeri* is not well known it seems to have a rather wide distribution in the Pacific. In this concern CUSHMAN stated (1927, p. 5) "there are numerous records for *E. serrata* in this region some of which at least may be *E. mestayeri.*" This species belongs to the second type, but owing to that the original figures are inacessible and those given in CUSHMAN's paper (1927) being unsatisfactory, the exact characters are unknown. *E. pacifica* has been recorded from numerous localities in the Pacific and *E. trigona* from the tropical to subtropical zone off the coasts of the Pacific and Atlantic sides of the Americas. In classification of the second type, the form of the sutures, spines and the median part of the ventral side are the most important factors. The result of the writer's classification is shown in Table 1 and figured in Figs. 8–17. As shown in Table 1, *E. bosoensis* and *E. bosoensis decorata* are distinct from all the other species of this type in their characteristic raised sutures, and *E. bosoensis decorata* differs from the species by having peculiar keels and almost straight dorsal line in apertural view.

In Japan, one more species of this genus has been discovered from the environs of Sendai, Miyagi Prefecture. Unfortunately the specimens are so small that the writer was unable to determine its relation to previously recorded species, it is described below.

Ehrenbergina sp.

Text-figures 18a-c.

Description:—Test small, triangle in dorsal view, lozenge in apertural view, subtriangle in side view; dorsal side convex, somewhat inflated at the middle part, ventral side with a median furrow, bounded by slightly concave slopes; edge rather sharp; short, small, outward-pointing spines from the edges of each chamber; chambers low and broad, slightly inflated and waved on dorsal side, depressed on ventral side, later ones uncoiled, about 5 pairs visible; dorsal sutures rather indistinct, overlapping less than half their length, depressed; ventral sutures raised, obscure on the median furrow; aperture elongate, narrow, nearly parallel to the margin. Length up to 0.20 mm; width up to 0.20 mm.

Hypotype:—IGPS loc. no. Mi-89; Road side cutting of Takata, Oide-mura, Natori-gun, Miyagi Prefecture. Lat. 38° 13′ 27″ N., Long. 140° 46′ 50″ E. Hatatate formation, Miocene. IGPS coll. cat. no. 67132.

Occurrence:—Common in the Hatatate formation.

Remarks:—This species differs from all of the other Japanese species of this genus by the smaller test, slightly inflated middle part and wavy chamber of the dorsal side. It may be a dwarfed form.

Literature

ASANO, K. (1938) Fossil Foraminiferal Assemblages from the Miura Reninsula; *Contr. Inst. Geol. Pal. Tohoku Univ. (in Japanese), no. 31,* pp. 1–55, pl. 1–5.

—— (1915) Illustrated Catalogue of Japanese Tertiary Smaller Foraminifera, pt. 7: Cassidulinidae.

BERMUDEZ, P. J. (1949) Tertiary smaller Foraminifera of the Dominican Republic; *Cushman Lab. Foram. Res. Spec. Publ. no. 25,* pp. 1–322, pl. 1–26, table 1. text-figs. 1–6.

BRADY, H. B. (1884) Report on the Foraminifera Dredged by H. M. S. CHALLENGER, During the Years 1873–1876; *Rep. Sci. Res. Voy. H. M. S. Challenger. Zool. vol. 9,* text pp. 1–814, table 1–4, pls. 1–115.

CUSHMAN, J. A. (1911) A Monograph of the Foraminifera of the North Pacific Ocean Pt. 2 Textulariidae: *Smithsonian Inst. U. S. Nat. Mus. Bull. 71,* pp. 1–108, text-figs. 1–156.

—— (1919) Recent Foraminifera from off New Zealand: *Proc. U. S. Nat. Mus., vol. 56,* pp. 593–640, pls. 74–75.

—— (1921) Foraminifera of the Philippine and Adjacent Seas; *Smithsonian Inst. U. S. Nat. Mus. Bull. 100. vol. 4, (Contr. Biol. Phil. Arch. Adj. Reg.),* pp. 1–608, pls. 1–190.

—— (1922) The Foraminifera of the Atlantic Ocean Pt. 3. Textulariidae: *Smithsonian Inst. U. S. Nat. Mus. Bull. 104,* pp. 1–149, pls. 1–26.

—— (1927) Foraminifera of the Genus *Ehrenbergina* and its Species: *Proc. U. S. Nat. Mus., vol. 70, art. 16,* pp. 1–8, pl. 1.

—— (1927) Recent Foraminifera from off the West Coast of America: *Bull. Scripps Inst. Oceanogr. Univ. Calif. Tech. Ser. vol. 1, no. 10,* pp. 119–188, pls. 1–6.

—— and GRAY, H. B. (1946) A Foraminiferal Fauna from the Pliocene of Timms Point, California: *Cushman Lab. Foram. Res., Spec. Publ. no. 19,* pp. 1–46, pls. 1–8.

ELLIPS, B. F. and A. R. MESSINA, (1940) Catalogue of Foraminifera. *Am. Mus. Nat. Hist. Spec. Publ. vol. 7.*

GALLOWAY, J. J. and HEMINWAY, C. E. (1941) The Tertiary Foraminifera of Porto Rico New York Acad. Sci.: *Scientific Survey of Porto Rico and the Virgin Islands. vol. 3, pt. 4,* pp. 275–491, pls. 1–36, trble 1–4.

LEROY, L. W. (1941) Small Foraminifera from the Late Tertiary of the Nederlands East Indies. *Quart. Colorado School Mines, vol. 36, no. 1,* pp. 1–132; 13 pls., 5 text-figs., 1 table.

—— (1944) Miocene Foraminifera from Sumatra and Java, Netherlands East Indies. *Quart. Colorado School Mines, vol. 39, no. 3,* pp. 1–113; 15 pls., 2 text-figs.

PUBLICATIONS RECEIVED

Gaceta Geologica, Ano 1, Nos. 1, 2, 1947.

Acta Zoologica, contents of vol. 1-28.

Amer. Midl. Nat., Vol. 26. Nos. 1-3, 1941; Vol. 27, Nos 1, 2, 1942; Vol. 36, No. 1. 1946; Vol. 37, Nos. 2, 3, 1947; Vol. 38, No. 1, 1947.

Univ. Texas Publ., No. 4246, 1941; No. 4301, 1943; No. 4329, 1943; No. 4621, 1946; No. 4824, 1948; No. 4915, 1949; No. 5015, 1950; No. 5019, 1950.

Proc. Calif. Acad. Sci., Ser. 4, Vol. 23, No. 41, 1947; Vol. 24, Nos. 8-12, 1948; Vol. 25, Nos. 15-18, 1944-1946; Vol. 26, Nos. 1-6, 10-14, 1948.

Occasional Paper, Calif. Acad. Sci., No. 21, 1945

Univ. Calif. Publ., Bull. Geol. Sci., Vol. 25, Nos. 5-8, 1940-1941; Vol. 26, No. 1, 1941; Vol. 27, Nos. 2, 3, 1943-1944; Vol. 28, Nos. 1-8, 1948.

Mem. Univ. Calif., Vol. 13, Nos. 1, 2, 1942.

Divisão de Formento da Produção Mineral, Boletim, Nos. 81, 82, 1947.

Divisão de Formento da Producão Mineral, Avulso, No. 76, 1947.

Laboratório da Produção Mineral, Boletim, Nos 19-29, 1945-1948.

Laboratório da Produção Mineral, Avulso, Nos. 7, 8, 1947-1948.

Divisão de Geologia e Mineralogia, Nos. 35, 38a, 49-45, 1946-1948.

Divisão de Geologia e Mineralogia Ano 1943-1945.

Servico Geologiço e Mineralogico do Brasil, Boletim, Nos. 100, 121, 122, 1946-1947.

Mitteil. Geol. Inst. Eldg. techn. Hochschule, Ser. A. Nos. 21-44, 47-50.

Mitteil. Geol. Inst. Eldg. techn. Hochschule, Ser. B, No. 7.

Mitteil. Geol, Inst. Eldg. techn. Hochschule, Ser. C, Nos. 17-19, 21-31, 38-42.

Univ. Texas, Bureau of Econ. Geol., Rep. Invest., Nos. 3-6, 1949.

Nouv. Arch. Mus. Hist. Nat. Lyon, Fasc. 1, 2, 1946-1949.

Bull. Wagner Free Inst. Sci., Vol. 22, Nos. 2, 4, 1947.

Notulae Naturae, Acad. Nat. Sci. Philad., No. 202, 1948.

Ministero Agricultura, Notas preliminare estudos. Nos. 46-49, 1948.

Ministero Agricultura, Boletim, Nos. 83, 123-131, 1948.

Ministero Agricultura, Avulso, No. 77, 1949.

Proc. Liverpool Geol. Soc., Vol. 20, Pts. 1, 2, 1949.

Rocznik Polskiego Towarzystwa Geologicznego, Vol. 18, 1949; Vol. 19, Nos. 1-4, 1950.

Dept. Nat. Prod. Mineral, Boletim, Nos. 30-33.

A New Cretaceous Alga from Kansas, 1948.

Cambrian Correlation between China and North America, 1947.

Beiträge zur geologiscnen Kart der Schweiz, N. F., 93, 1948.

Beiträge zur Kenntnis der Hervetischen Trias Östlich des Klausenpasses, 1948.

Stratigraphie und Mikrofauna des Klippenmalm, 1949.

Zur Geologie des Tödigruppe, 1948.

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Geologische Untersuchungen im Gd. Combin-Gebiet zwischen Dranse de Bagnes und Dranse d'Entremont, 1949.

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Trans. Proc. Palaeont. Soc. Japan N.S., No. 3, pp. 95—96, Sept. 1951.

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「日本古生物學會第 45 回例會」昭和 26 年 2 月 14 日九州大學理學部地質學教室に於て開催す（參會者 19 名）。講演者並に講演題目次の如し。

The Marine Fauna from the Liutang Series of the Niuhsintai Coal-field, South Manchuria .....Mitsuo NODA

紡錘虫の新属 *Minoella* (代読).....
..... 藤本治義・鹿沼茂三郎

Some New Species of *Yabeina* and *Lepidolina* from the Kuma Group, with a Remark on their Stratigraphic Significance .....Kametoshi KAMMERA

New Peculiar Fusulinid Genus from the Akiyoshi Limestone (代読).....
.....Ryuzo TORIYAMA

九州第三紀 *Cyclammina* について .....
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日本産化石 *Astriclypeus* について（附新亞種の記載）(代読) .....森下 晶

The Ontogeny of *Metaplacenticeras subtilistriatum* (JIMBO).....
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The Triassic Fauna of the Heki Formation in the Province of Tamba (Kyoto Prefecture), Japan. (代読)...
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Some Late Triassic Fossils from the Nariwa District in the Province of Bitchu (Okayama Prefecture), Japan. (代読).....Teiichi KOBAYASHI & Koichiro ICHIKAWA

長門三疊紀美禰統産 *Taeniopteris* の 1 新種（山口県中生代植物化石記載ノート 5) (代読) .....高橋英太郎

滿洲熱河省凌源産世界最古の *Sequoia* (代読) .....遠藤誠道

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Note on *Cathaysiopteris Whitei* (HALL) KOIZ. from Taiyuan, Shansi and its Relation to *Gigantopteris americana* (代読) ...Enzo KON'NO & Kazuo ASAMA

On *Manchuriotheca fukienensis* n. sp. from Fukien, China (代読).....
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Epistomina concentricana (P. & J.) と Genus *Mississippina* HOWE との関係
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